The W4KDA Loop Skywire

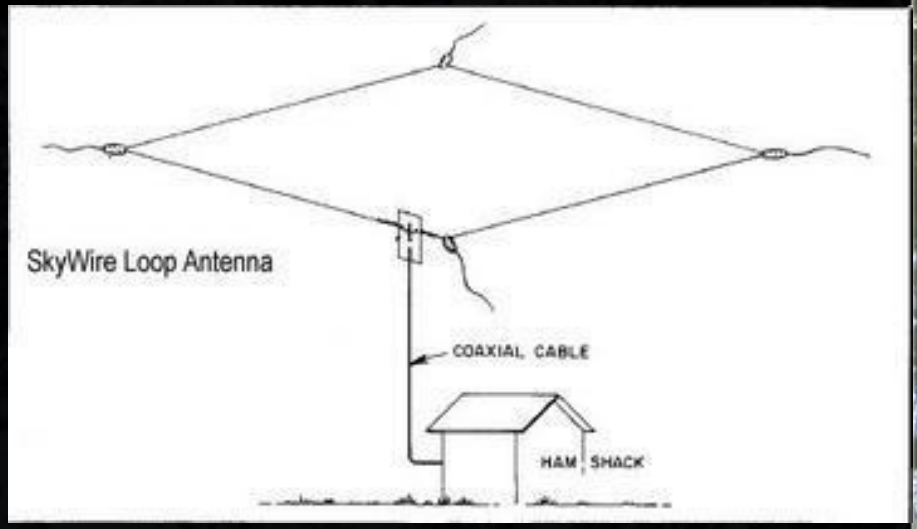
"One Antenna to Rule Them All"

by

Kyle D. Albritton

Loop Skywires

- Full wave horizontal loop
- Multi Band
- Omni Directional
- Resonant on *even* harmonics
- Horizontal polarization



“If I could only have one HF antenna, it would be a loop skywire.”

WARNING:

There is no such thing as a perfect antenna.

W4KDA's Original Build

- 160m long
- 529' of 18 AWG stranded wire
- L = 1004 / f
- 20 – 50' off the ground
- Simple coax to wire break out (no BALUN)
- “Tuner” at the radio
- This is the way most hams install and use their loops
- Worked “okay” at best

Analysis

- Checked it with MFJ269 analyzer
- Resonant on 160, 80, 40, 20, 12, 10m
- 12m resonance was unexpected
- Z/Θ impedances were 8 to 129 ohms, none near 50
- No impedance “curve” - Z went up and down randomly by band
- Impedance did not match any coax or ladder line
- No single gamma match or matching stub network could make the impedance match on all bands
- Major losses due to SWR

Current Design

- Moved the tuner to the loop (more later)
- Installed 1:1 BALUN
- 50 ohms from radio to loop
- Reduces losses due to SWR
- Also installed duplexers (more later)
- Huge Difference in antenna performance
- Now the loop has “big ears”
- Now it works on 15m, 17m, 30m, 60m too!

Advantages

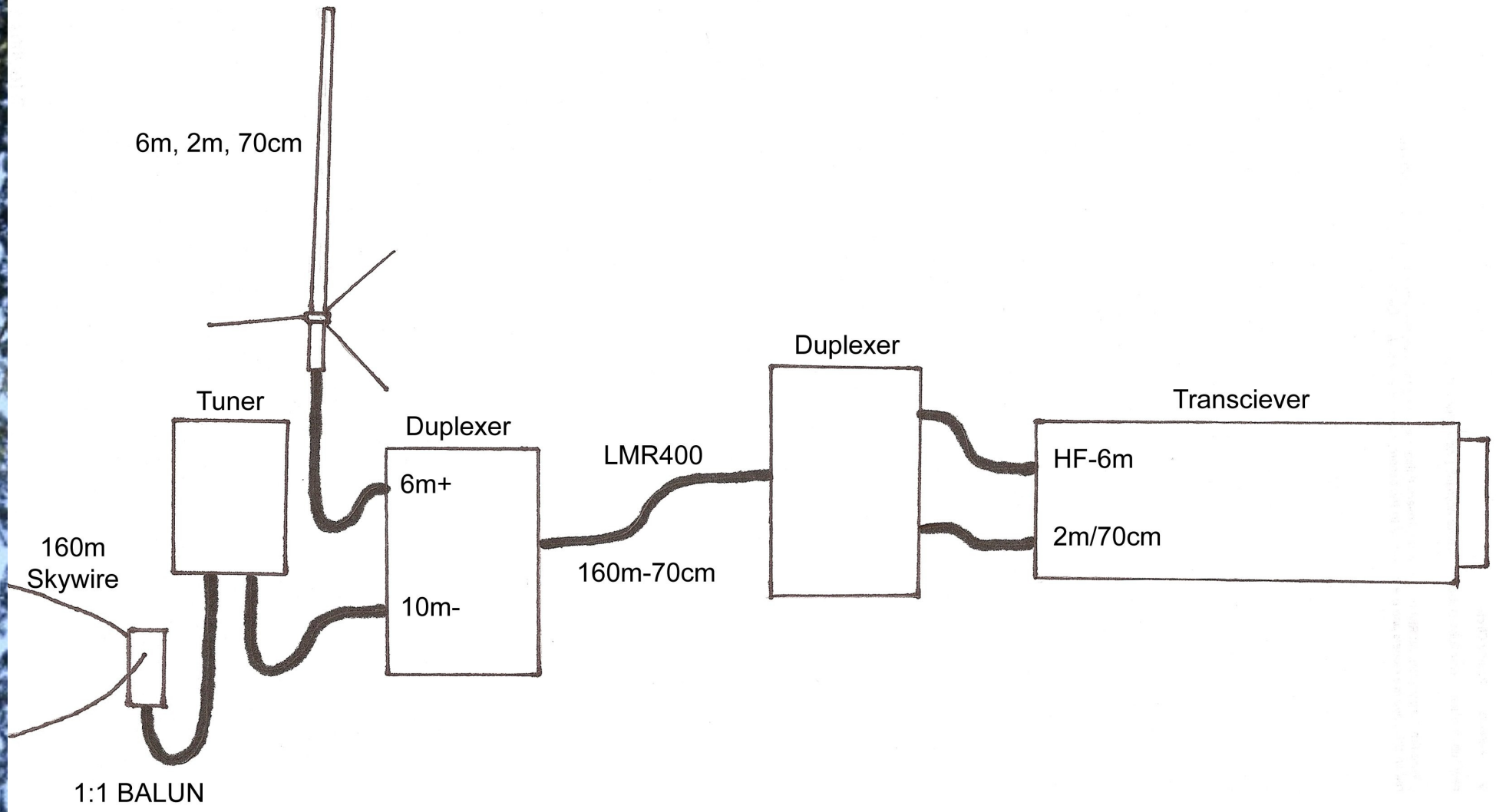
- You can work [almost] everyone you can hear
- You can hear exceptionally well
- Quiet, naturally noise canceling
- Inexpensive
- Nearly invisible – *stealth*
- Easy to construct and install
- A mix of NVIS and DX lobes (more later)

Disadvantages

- Large, although you can go *around* a house
- Omni directional, so you cannot get away from stations you do not wish to hear
- Example: Could not hear North American amateurs over AM & FM broadcast stations on 40m until recently
- Fragile as any other wire antenna, but a much larger target

LDG Z-11 Pro in NEMA Box

W4KDA Antenna System Connection Diagram



Lobes

- Has energy low toward to the horizon (DX)
- Has energy high toward the zenith (NVIS)
- “Strange” lobe pattern and changes somewhat by band
- 10 – 20m are very DX oriented
- 40 – 160m have more NVIS
- On 80m the W4KDA loop has complete coverage of the country with *no skip zone*

Gain

- ~ 2.1 dBd of gain for a square
- ~ 1.1 dBd in a triangle
- A perfect circle shows ~ 1dB gain over a square
- No concave corners – loop shape *must* be convex

Results

- Worked K5D and PJ2T with ease
- Hardly ever have to call more than 3 times
- Break most pile ups on 1st or 2nd try (barefoot)
- Worked many DX stations on 17m

Web URLs for More Information

- Dr. Ace: http://www.bloomington.in.us/~wh2t/loop.html
- Dave Fischer W0MHS: http://srgproperties.inetusanow.net/files_custom/9467_2192.pdf
- Yahoo Skywires Group: http://groups.yahoo.com/group/Skywires/